TORREYA

ON THE RELATION OF REDWOODS AND FOG TO THE GENERAL PRECIPITATION IN THE REDWOOD BELT OF CALIFORNIA

By W. A. Cannon

It is well known to all dwellers in regions which are frequently covered by fog that fog acts to conserve, as well as to increase, the general amount of moisture, and while, so far as I know, no data have been compiled touching either of these effects, they undoubtedly play an important part in the plant life of the region. This is well illustrated by the inland distribution of the redwood on the west coast of the United States.   As is well known, the redwoods occur in the fog-belt of the northern half of California, and are confined in a markedly restricted manner to those portions of the coast mountain ranges, such as ravines, which, on account of favoring topographical conditions, the fog may reach. The restriction of the distribution to so narrow a zone is, perhaps, not due so much to the negative factor, the conservation of moisture already present, as to the positive one, the actual precipitation of water from the fog.   While this, without question, is an important factor in the total precipitation in any region subject to fog, it becomes very much more marked, I am convinced, in that region where the redwood forests are found. The reason for this lies in the character of the foliage of the redwood.   Because the leaves of the redwood are small and closely set together on the twigs, and because both twigs and leaves are relatively delicate, the boughs which they help to form are fern-like in general appearance and constitute a very effective filter, by which

water may be " combed " out from the fog. In the effectiveness of this filtering process, which is said to be a good method for removing water from the fog, lies, I believe, an important reason why the redwood loves the zone subject to fogs. And it will be readily seen that this factor not only increases the general amount of moisture in the region, but it supplies the redwood itself with a proper amount of water at a time when there is the least rainfall, that is, in the late summer and early autumn, when the fogs are especially abundant.

So far as I know, there is no method in use for determining the amount of fog precipitation. The amount of water in a fog which extends vertically 1000 feet may be equal to 0.1 inch rainfall.* But, of course, only a small portion of this is precipitated. This amount, however, can be greatly increased if the fog is passed through such a filter as is formed by a redwood forest, and under such conditions the amount of water taken out of the fog by the trees is considerable. Two or three illustrations will show this at least approximately. I have been told by a gentleman who owned a large ranch in the redwood belt, and whose observation was quite trustworthy, that whenever there was a fog, especially if accompanied by a wind, the soil beneath the trees appeared as if drenched by a heavy rain ; and that, further, in cases of fires in his forest, if a fog came up accompanied by wind, the fires could be brought under control. To any person who has seen the force and destructiveness of a forest fire this observation will appear very significant. The relation of the redwood to fog precipitation is shown in another way, which, although sufficiently *bizarre* in itself, is vouched for, and may lend a hint to a possible manner of estimating the amount of water precipitated in this manner. On the " hog-back " of the Santa Moreno mountains lives a woodchopper, in a place once heavily covered by a redwood forest, but where there is left only an occasional large tree. Like other mountaineers, he must use water for culinary purposes at least, and in lieu of a convenient spring or well he has devised a unique " tree-well." The chopper has fashioned

* Alexander McAdie, Fog Studies on Mt. Tamalpais. .Pop. Sci. Monthly, **59** : 535. O. 1901.

the ground beneath a large redwood into the form of a trough at the lower end of which he has placed a barrel, and I have it on good authority that in this primitive manner he obtains sufficient water for his needs. However picturesque a "tree-well" may appear, I believe, as does also Prof. W. R. Dudley, of Stanford University, who has studied these conditions for several years, that a receptacle for the water which the tree "combs" out from the fog might be so placed that it would catch nearly all of the water thus retained, in a manner analogous to that employed by the chopper, and from data thus obtained some estimate of the total fog precipitation in a redwood forest might be had. It is hardly necessary to say that in any such calculation the density of the fog, the rate of the wind, as well as the character of the forest, and other factors would have to be considered, all of which could be worked out for each time of calculation.

A comparative study of the amount of water which different species of forest trees are able to take from fog could not fail to be of interest, and may be found to be of great moment in the life processes of the denizens of the region. And may it not be that the increased amount of the total precipitation brought about especially by the redwoods as just described, and its more uniform distribution throughout the year, will prove to be an important and possibly a determining factor in reforesting a denuded redwood area?

ARE THE LEAVES OF "SIMPLE–LEAVED AMPELOPSIS" SIMPLE?

By Byron D. Halsted

A vine of *Ampelopsis cordata* Michx., growing upon my house piazza has interested me during the autumn days by the reluctant way in which it drops its leaves. It keeps them green for weeks after the leaflets of the American ivy [*Parthenocissus quinquefolia* (L.)] have taken on a blaze of colors and gone. The last-named vine, as is well known, has its leaves compounded of five leaflets and accommodates their departure by providing each leaflet with a "letter of dismissal" that is composed through the season's